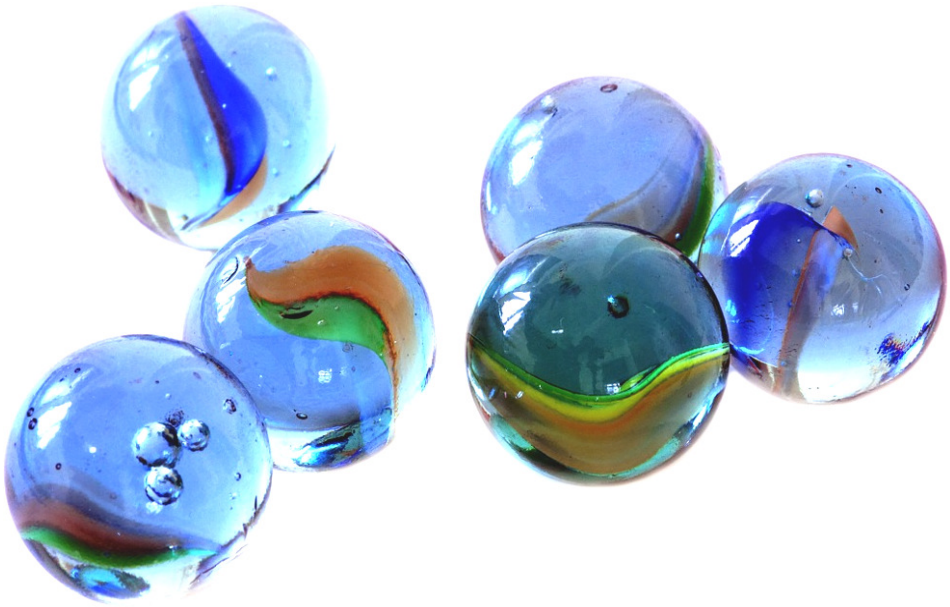
FINAL PROJECT

MCT151: INTRODUCTION TO MECHATRONICS (Spring 15)

Project Description



The project has the objective to design and build a **marble race track**.

It is possible to work in groups of 2, max 3 students per marble race track. The project lasts from the 8th to the 13th week of the semester. Tutorials are held to introduce the student into the task, strengthen their understanding of the requirements and support creative ideas with technical, possible solutions.

The project wants to strongly connect between Product Design and Mechatronics: the Design part has the objective of enhancing the students' capacity to go through the design process by keeping in mind the aesthetical necessities of a successful product. The modular approach for components, interesting evolving solutions for the marbles as well as well-formed elements are crucial for the task. The Mechatronic part needs to focus on the entire system with its specifications and applications for determined automation processes, handling and applying the engineering concept of a system.

The main materials that can be used singularly or combined are metal, mdf and wood. Secondary components for connecting elements or the automation are supposed to be added.

In details and keywords:

1. Height of the track min 30, max 60 cm, ground area ca 0.25 m^2
2. The marble need to change at least 10 direction
3. The marble need to be lifted from the ground area with electromechanical support, in an interesting mechanism. This mechanism needs to be seen as one of the main elements of the design.
4. The marble need to undertake at least one of the following tasks while running on the track:

    a. Push a wheel
    b. Clap down an element
    c. Make a small loop
    d. Make a jump in air for some centimeters.

Description of the Mechatronics Part

For Sophomore level students:

Students are asked to make the marble race track a mechatronic system, where a sensor is used to detect the moving marble. Then use an electrically (Dc/Servo) actuated arm to guide the marble on the track only when a marble is coming. The students have to use a microcontroller to control the track.

For the Junior level students:

Students will be given different sizes of marbles, the race track has to be a mechatronic system where it is able to select one size of the marbles to continue on the race track and drop the unwanted sizes into a separate container. A sensor and an electrically actuated arm may be used to direct the selected size to continue on the track. The arm will be active only when the right size is detected. The students have to use a microcontroller to control the track. Note that the selected marble size may be an average sized marbles (neither smallest nor biggest).

Timing:

Deadline for Group Formation: 13/4/2015
Final Submission & Oral Exam: TBD (during the week starting 30/5/2015)

P.S. Each student will enter the final oral exam with a printed report showing his work. Even though the report content can be the same for the whole group but each student should have one printed for himself.